MEASURING BENEFITS FROM NATURAL RESOURCE CONSERVATION: THE CASE OF THE CENTRAL VISAYAS REGIONAL PROJECTS-I

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MEASURING BENEFITS FROM NATURAL RESOURCE CONSERVATION: THE CASE OF THE CENTRAL VISAYAS REGIONAL PROJECTS - I*

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I. INTRODUCTION

The Central Visayas Regional Projects (CVRP-I), a regionbased, rural development effort is now on its final (eighth) year of implementation. Adapting to the emerging demands of participatory development and changes in the Philippine administrative structure it has focused on community-based implementation of natural resource-management projects and a devolution from region to local government units for project management (External Review 1988).

Notwithstanding such modifications in the level of project implementation or nature (and size) of administrative structure, the principles of area-wide resource management with emphasis on local, community-based participation has prevailed. A shift from projects to program-mode of implementation has also been instituted, following recommendations of the Midterm Project Review (1986).

This paper presents the results of a monitoring study conducted in 1989 on CVRP-I impacts with the following objectives: (1) to measure benefits derived from the project, from individual participants' perspective; (2) to measure practices which are expected to significantly affect the resource systems concerned, and (3) to serve as the initial phase for subsequent impact evaluation.

II. CONCEPTUAL FRAMEWORK AND RESEARCH METHODOLOGY

To examine the broad conceptual framework for analyzing CVRP -I, we note the following salient features:

1. CVRP target beneficiaries are among the poorest groups located in the depressed environmentally stressed areas in the region.

2. Resource conservation schemes are central in its technology interventions for improving rural living standards.

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3. It is implemented through community-based resource management (CBRM) activities, in all of its three components (nearshore fishery, upland agriculture and social forestry) and thus follows the bottom-up, grassroots development ethic.

These imply that the measurement of benefits of CVRP should be conducted for the three types of target sets, namely, (a) the households, particularly the cooperators[1] of the CVRP activities; (b) the natural ecosystems upon which resource management activities are conducted, and (c) the institutions through which CVRP activities are implemented, specially those at local government levels.

The focus of this report is the measurement of benefits experienced by households whose conduct of resource conservation activities is expected to improve living standards as well as enhance environmental quality.

The *general hypothesis* being pursued is thus:

Project cooperators tend to experience higher improvements in quality of life (or conversely, lower declines in deterioration in levels of living) than non-cooperators, *ceteris paribus.*

To prove this assertion, we first establish that CVRP has gained importance in household management of natural resources. Its importance is tested in the following hypothesis:

Hypothesis 1:

Variations in the conduct of specific resource conservation activities are explained in terms of participation in CVRP.

After six years of implementation it is no longer expected or desirable that the CVRP influence is still confined to the site level or to the set of project participants. By this time, its influence should have spread and is likely to be manifested in several ways. For example, non-participants may have also learned resource conservation technologies through demonstration effects. Or they may be using the same physical infrastructure (e.g., trails and roads) that CVRP installed. Or they may themselves be availing of some excess project inputs. It is thus probable that there are non-participants who practice CVRP techniques. On the other hand, it is also likely that there are CVRP-participants who do not practice some (or all) of the resource conservation techniques due to deterring individual limitations (e.g., they are slow learners or are busy with other activities), ineffective project management (e.g., slow site managers, input problems, untimely fund releases), environmental conditions (e.g. weather) or institutional bottlenecks (e.g., uncooperative and inflexible government agencies).

Given these factors, variations in the practice of favorable resource management activities are expected among CVRP participants as well as among the non-participants. However, the availability of inputs and technical information for CVRP cooperators make them likely to adopt more resource

1. The terms "cooperators," "participants," and "adoptors" refer to those who are formally listed as participants of CVRP-I.

conservation techniques than non-adoptors. Here, we employ one method for testing hypothesis 1, that is, **a comparison of resource conservation activities in 1989 between CVRP participants and non-participants.**

Once it is established that the differences in the conduct of resource conservation are due to participation in CVRP, we pursue the next hypothesis :

Hypothesis 2:

Participation in CVRP implies improvement in the welfare of cooperators as against non-cooperators.

Two steps were taken to test this hypothesis, as follows:

1. the measurement of income changes between CVRP participants and non-participants before (e.g., 1985) and during CVRP (i.e., 1988); and,

2. a comparison of the perceptions and quality of life indicators between adoptors and non-adoptors during 1989.

A survey was conducted in 1989 to generate information on resource conservation practices in the project sites, and to provide a second data set to be compared with the first project survey three years earlier, in 1986. Random samples of respondent cooperators and non-cooperators were gathered; their composition is presented in Annex Table A.

III. EMPIRICAL RESULTS AND DISCUSSION

A. Resource Conservation Practices

Tables 1-3 present the practice of various conservation activities initiated by CVRP-I in three components: upland agriculture (UA), nearshore fisheries (NSF), and social forestry (SF). On the whole we note that project activities are practiced by both cooperators and non-cooperators, but a higher proportion of CVRP participants implement project activities than non-participants.

1. Upland Agriculture

The practices prescribed for stabilization of upland ecosystems include:

(a) those aimed at improving farm management such as farm planning;

(b) those aimed at restoring on-site soil fertility such as fallowing and construction of contour bunds, rockwalls, or hedgerows;

Table 1
Practice of Resource Conservation in Upland Agriculture Sites, 1989

1. FARM PLANNING

	COOPERATORS		NON-COOPERATORS	
Yes	90	(68%)	49	(42%)
No	43	(32%)	69	(58%)
	133	(100%)	118	(100%)

Conclusion. A higher proportion of CVRP cooperators conduct farm planning than non-cooperators.

Chi-square = 16.253 > 3.84 (at prob. = .05).

2. USE OF DIVERSION CANALS

	COOPERATORS		NON-COOPERATORS	
Yes	56	(43%)	21	(18%)
No	74	(57%)	96	(82%)
	130	(100%)	117	(100%)

Conclusion: A significantly higher proportion of adoptors (43%) construct diversion canals compared to non-adoptors (18%).

Chi-square = 16.970 > 3.84 (at prob. .05).

3. CONTOUR BUNDING

	COOPERATORS		NON-COOPERATORS	
Yes	98	(73%)	19	(16%)
No	37	(27%)	100	(84%)
	135	(100%)	119	(100%)

Conclusion: More adoptors (73%) contour bund than non-adoptors (16%).

Chi-square = 79.365 > 3.84 (at prob. = .05).

Table 1 (cont'd)

4. USE OF HEDGEROWS

	COOPERATORS		NON-COOPERATORS	
Yes	66	(50%)	8	(7%)
No	65	(50%)	105	(93%)
	131	(100%)	113	(100%)

Conclusion: Hedgerows are used by a higher percentage of CVRP adoptors (50%) than non-adoptors (7%).

Chi-square = 51.807 > 3.84 (at prob. = .05).

5. USE OF ROCKWALLS

	COOPERATORS		NON-COOPERATORS	
Yes	48	(36%)	20	(21%)
No	85	(64%)	95	(83%)
	133	(100%)	115	(100%)

Conclusion: A higher percentage have rockwalls among adoptors vs. non-adoptors (36% vs. 21%).

Chi-square = 9.916 > 3.84 (at prob. = .05).

6. USE OF CHECKDAMS

	COOPERATORS		NON-COOPERATORS	
Yes	31	(24%)	15	(14%)
No	99	(76%)	96	(86%)
	130	(100%)	111	(100%)

Conclusion: Checkdams are used by a greater proportion of adoptors (24%) versus non-adoptors (14%), at lower significance level.

Chi-square = 3.497 < 3.84 (at prob. = .05);
= 3.497 > 2.71 (at prob. = .10).

Table 1 (cont'd.)

7. FALLOWING

	COOPERATORS		NON-COOPERATORS	
Yes	56	(48%)	32	(31%)
No	61	(52%)	70	(69%)
	117	(100%)	102	(100%)

Conclusion: More adoptors (48%) fallow their farms than non-adoptors (31%).

Chi-square = 5.498 > 3.84 (at prob. = .05).

8. AGRO/FORESTRY

	COOPERATORS		NON-COOPERATORS	
Yes	64	(50%)	14	(12%)
No	64	(50%)	99	(88%)
	128	(100%)	113	(100%)

Conclusion: Agroforestry is practiced at higher incidence among adoptors (50%) than non-adoptors (12%).

Chi-square = 37.084 > 3.84 (at prob. = .05).

9. CROP DIVERSIFICATION

	COOPERATORS		NON-COOPERATORS	
Yes	79	(59%)	66	(41%)
No	54	(41%)	66	(59%)
	133	(100%)	112	(100%)

Conclusion: More CVRP cooperators (59%) practice crop diversification compared to non-cooperators (41%).

Chi-square = 7.455 > 3.84 (at prob. = .05).

Source: 1989 Household Survey, CVRP-I Benefit Monitoring Study.

(c) those aimed at increasing income and minimizing risks like agroforestry and crop diversification; and

(d) those that contribute to water management like diversion canals and the use of checkdams.

It is only in the construction of checkdams, introduced in 1988, that no significant difference was noted in the incidence of practice among adoptors and among non-adoptors. In all the others, more CVRP cooperators consistently practiced the prescribed activities than non-cooperators. This was true even for such activities as construction of contour bunds, hedgerows, and rockwalls, which could substitute for each other and whose implementation depended greatly on site conditions. In addition, the practice of farm planning was more prevalent among cooperators than non-cooperators, even though prior to CVRP-I extension workers from the Department of Agriculture had introduced this activity to all site residents.

In brief, resource conservation activities in upland agriculture sites can be attributed largely to CVRP. Both the cooperators and non-cooperators practice these activities, although the *incidence is higher* among the cooperators.

2. Nearshore Fisheries

The behavior of respondent fishermen in nearshore fishery sites showed significant variations in the following activities (Table 2): use of artificial reefs, seafarming or mariculture, coral reef fishing, hook and line fishing, and the use of fish attracting device (FAD).

Hook and line fishing is encouraged in areas where there are FADs for sustaining fish catch. More cooperators conduct this activity than non-cooperators.

On the other hand, digging miracle holes in mangroves has low incidence. There is no difference in incidence between adoptors and non-adoptors. This activity was implemented only recently and is not widely applicable to all areas. In the case of traditional fishing practices such as seine, fish trap, and gillnet fishing, no apparent difference exists between CVRP adoptors and non-adoptors.

3. Social Forestry

The social forestry component is conducted at only one site and involves mainly timber stand improvement and reforestation. Both these activities are expected to result in increased future returns. Another activity, community timber utilization, was suspended indefinitely.[2] Table 3 shows the significantly larger proportion of cooperators doing timber stand improvement and reforestation work than non-cooperators. However, the two groups do not differ in their non-practice of agroforestry.

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2. The Department of Environment and Natural Resources (DENR) is in the process of selecting three FOSAS to be granted community timber utilization permits through CVRP-I and three others through non-governmental organizations.

Table 2
PRACTICE OF RESOURCE CONSERVATION IN NEARSHORE FISHERIES SITES, 1989

1. USE OF ARTIFICIAL REEFS

	COOPERATORS		NON-COOPERATORS	
Yes	84	62%	18	16%
No	52	38%	93	84%
	136	100%	111	100%

Conclusion: More cooperators (62%) participate in the construction of artificial reefs as compared to non-cooperators (16%).

Chi-square = 50.442 > 3.84 (at prob. = .05).

2. MARICULTURE AND SEAFARMING

	COOPERATORS		NON-COOPERATORS	
Yes	23	18%	9	8%
No	104	82%	100	92%
	127	100%	109	100%

Conclusion: More adoptors (18%) go into mariculture and sea farming compared to non-adoptors (8%).

Chi-square = 4.055 > 3.84 (at prob. = .05).

3. CORAL REEF ACTIVITIES

	COOPERATORS		NON-COOPERATORS	
Yes	41	32%	8	7%
No	89	68%	103	93%
	130	100%	111	100%

Conclusion: A higher proportion of CVRP participants partake in coral reef activities compared to non-participants (31% versus 7%).

Chi-square = 20.407 > 3.84 (at prob. = .05).

Table 2 (cont'd)

4. USE OF FISH ATTRACTING DEVICE (FAD)

	COOPERATORS		NON-COOPERATORS	
Yes	44	34%	12	11%
No	85	66%	98	89%
	129	100%	110	100%

Conclusion: Among adoptors, a greater number (34%) uses fish attraction devices versus the non-adoptors (11%).

Chi-square = 16.542 > 3.84 (at prob. = .05).

5. MIRACLE HOLE IN MANGROVES

	COOPERATORS		NON-COOPERATORS	
Yes	8	6%	4	4%
No	117	94%	106	96%
	125	100%	110	100%

Conclusion: There is no difference in the use of miracle hole in mangroves between cooperators and non-cooperators (6% versus 4%).

Chi-square = 0.440 < 3.84 (at prob. = .05).

6. NUMBER OF RESPONDENTS USING HOOK & LINE FOR FISHING

	COOPERATORS		NON-COOPERATORS	
Yes	76	100%	26	87%
No		0%	4	13%
	76	100%	30	100%

Conclusion: All adoptors practice hook and line fishing versus non-adoptors.

Chi-square = 7.179 > 3.84 (at prob. = .05).

Table 2 (cont'd.)

7. NUMBER OF RESPONDENTS USING SEINE METHOD FOR FISHING

	COOPERATORS		NON-COOPERATORS	
Yes	1	1%	1	1%
No	123	99%	86	99%
	124	100%	87	100%

Conclusion: There is no difference between adoptors and non-adoptors in the use of seine fishing method.

Chi-square = 0.220 < 3.84 (at prob. = .05).

8. NUMBER OF RESPONDENTS USING FISH TRAPS

	COOPERATORS		NON-COOPERATORS	
Yes	8	89%	1	100%
No	1	11%	-	
	9	100%	1	100%

Conclusion: There is insufficient information for concluding that use of fish traps difffers between adoptors and non-adoptors.

Chi-square = 1.975 < 3.84 (at prob. = .05).

9. NUMBER OF RESPONDENTS USING GILLNET

	COOPERATORS		NON-COOPERATORS	
Yes	34	94%	16	94%
No	2	6%	1	6%
	36	100%	17	100%

Conclusion: Use of gillnets does not differ between cooperators and non-cooperators.

Chi-square = .0347 < 3.84 (at prob. = .05).

Source: 1989 Household Survey, CVRP-I Benefit Monitoring Study.

Table 3
PRACTICE OF RESOURCE CONSERVATION AT THE SOCIAL FORESTRY SITE, 1989

1. TIMBER STAND IMPROVEMENT

	COOPERATORS		NON-COOPERATORS	
Yes	35	56%	20	38%
No	28	44%	33	62%
	63	100%	53	100%

Conclusion: Conduct of timber stand improvement is more prevalent among adoptors (56%) than among non-adoptors (38%).

Chi-square = 2.986 < 3.84 (at prob. = .05).
2.986 > 2.71 (at prob = .10).

2. REFORESTATION OF DENUDED AREAS

	COOPERATORS		NON-COOPERATORS	
Yes	40	65%	17	33%
No	22	35%	35	67%
	62	100%	52	100%

Conclusion: Reforestation of denuded areas is more prevalent among cooperators (65%) than among non-cooperators (33%).

Chi-square = 10.219 > 3.84 (at prob. = .05).

3. NUMBER OF PARTICIPANTS WITH AGRO-FORESTRY IN CSC AREA

	COOPERATORS		NON-COOPERATORS	
Yes	1	2%	3	8%
No	44	98%	33	92%
	45	100%	36	100%

Conclusion: There is no difference between adoptors and non-adoptors in their non-practice of agro-forestry.

Chi-square = 0.556 < 3.84 (at prob. = .05).

Source: 1989 Household Survey, CVRP-I Benefit Monitoring Study.

B. Income Changes During 1985-1988

1. Panel Data Analysis

The total gross income for calendar years 1985 and 1988 were calculated based on the 1986 and 1989 surveys of the output of various activities. The 1989 survey estimated the income from different sources, including home-consumed produce; these were summed up to obtain total gross income for the same respondents.

T-tests were conducted to determine the income differences between the 1985 group and the 1988 group, and the changes in income between adoptors and non-adoptors during 1985-1988. The results are presented in Tables 4-7 for the different sites. The conclusions are summarized in Table 8. Data on panel respondents are reported in Annex Table A.

On the whole, CVRP-I adoptors were poorer than the non-adoptors before the project, indicating that the target beneficiaries indeed consisted of poorer members of society. In 1988, however, the average gross income of the cooperators were higher than that of non-cooperators. Real increments for adoptors amounted to ₱ 5,674 in 1985-1988 as compared with the ₱ 2,613 for non-adoptors in the same period (Table 4).

The specific project component sites showed mixed results. Table 5 shows that in upland agriculture sites, the income of CVRP adoptors changed drastically during the three-year period compared with that of non-adoptors (₱ 6,879 vs. ₱ 2,700 increase). Although the pre-project (1985) income of adoptors, which was lower than that of non-adoptors, experienced a higher average increase in mid-project (1988), it is not statistically significant because of large income variations across individuals in both groups.

On the other hand, the effect of CVRP-I on nearshore fishery respondents was clear. The cooperators were poorer in 1985, with mean income of ₱ 4,216, while the non-cooperators had an average income of ₱ 6,119 (Table 6). In 1988, the average income of both groups had no statistical difference, implying that within three years of the project the poorer adoptors were able to catch up.

In the case of social forestry, there are no discernible statistical differences between income of project participants and of non-participants.

To validate these results, we explored another method. We conducted similar tests on subsets of panel respondents composed of active adoptors and inactive non-adoptors (or pure non-adoptors). The aim was to detect possible extreme differences in income that could be totally explained by practice and non-practice of CVRP activities.

Test results showed no statistically significant differences between the two groups' income. This indicates that non-adoption of CVRP's resource conservation practices did not necessarily mean lower income. It is possible that the non-adoption or non-participation is due to the presence of alternative livelihood sources, such as employment. Therefore, the differences in income and in income changes reported above are most likely due to variations in conservation practices by the formal CVRP adoptors and by the informal adoptors (or active non-adoptors). This is an indication of CVRP spread effects.

Table 4
Income Tests: CVRP-I Cooperators vs. Non-cooperators, All Projects

1. DIFFERENCE IN 1985 INCOME

	COOPERATORS		NON-COOPERATORS
MEAN =	P/ 4,356.0	P/	5,446.1
STD. DEV. =	P/ 3,519.8	P/	4,941.8
N =	57		46
DIFFERENCE =			(1,090.0)
STD. ERROR OF DIFFERENCE =			835.0
T =	-1.3054 (D.F. = 101)		
PROB. =	0.0974		

Conclusion: CVRP-I cooperators had significantly lower 1985 incomes than non-cooperators prior to their participation in project activities, at 90 percent confidence level.

2. DIFFERENCE IN 1988 (REAL) INCOME a/

	COOPERATORS		NON-COOPERATORS
MEAN =	P 10,029.9	P	8,057.4
STD. DEV. =	P 10,785.1	P	7,830.0
N =	57		46
DIFFERENCE =		P/	1,972.6
STD. ERROR OF DIFFERENCE =			1,899.1
T =	1.0387 (D.F. = 101)		
PROB. =	0.1507		

Conclusion: CVRP-I cooperators earned higher real incomes in 1988 compared to non-cooperators at 80 percent confidence level.

Table 4 (cont'd.)

3. DIFFERENCE IN REAL INCOME CHANGE, 1985-88

	COOPERATORS		NON-COOPERATORS
MEAN = P	5,673.9	P	2,611.3
STD. DEV. = P	11,335.1	P	10,182.0
N =	57		46
DIFFERENCE =		P/	3,062.6
STD. ERROR OF DIFFERENCE =			2,147.8
T =	1.4259 (D.F. = 101)		
PROB. =	0.0785		

Conclusion: The average increase in CVRP-I cooperators' income by P5,674 during the period 1985-88 is significantly higher than that of P2611 for non-cooperators at 90 percent level of confidence

a/ Current 1988 income was deflated to 1985 terms using the national CPI. The Region VII CPI indicates lower price increases as compared to the national CPI.

Source: 1989 Household Survey, CVRP-I Benefit Monitoring Study.

Table 5

INCOME TESTS: UPLAND AGRICULTURE (UA) PROJECT COOPERATORS VS. NON-COOPERATORS

1. DIFFERENCE IN 1985 INCOME

		COOPERATORS		NON-COOPERATORS
MEAN =	P	4,388.5	P	5,061.6
STD. DEV. =	P	3,528.6	P	5,772.4
N =		27		14
DIFFERENCE =				-673.0
STD. ERROR OF DIFFERENCE =				1,450.9
T =		-0.4639 (D.F. = 39)		
PROB. =		0.3227		

Conclusion: Although the mean 1985 income of UA cooperators was lower than the non-cooperators' average 1985 income, the difference is not statistically significant.

2. DIFFERENCE IN 1988 REAL INCOME a/

		COOPERATORS		NON-COOPERATORS
MEAN =	P	11,267.8	P	7,783.8
STD. DEV. =	P	13,799.9	P	12,721.2
N =		27		14
DIFFERENCE =				3,484.0
STD. ERROR OF DIFFERENCE =				4,429.6
T =		0.7865 (D.F. = 39)		
PROB. =		0.2182		

Conclusion: Although the UA cooperators have higher average 1988 real income than non-cooperators the difference is not statistically significant.

Table 5 (cont'd.)

3. DIFFERENCE IN REAL INCOME CHANGE, 1985-88

	COOPERATORS		NON-COOPERATORS
MEAN =	P 6,879.3	P	2,722.3
STD. DEV. =	P 13,763.1	P	15,062.5
N =	27		14
DIFFERENCE =			4,157.0
STD ERROR OF DIFFERENCE =			4,679.8
T =	0.8883 (D.F. = 39)		
PROB. =	0.1899		

Conclusion: On the average, increase in real income by P6,879 experienced by the UA cooperators is higher than the P2,700 increase among non-cooperators at 80 percent confidence level.

a/ Current 1988 income was deflated to 1985 terms usisng the national CPI. The Region VII CPI indicates lower price increases as compared to the national CPI.

Source: 1989 Household Survey, CVRP-I Benefit Monitoring Study.

Table 6
Income Tests: Nearshore Fisheries (NSF) Project Cooperators vs. Non-Cooperators

1. DIFFERENCE IN 1985 INCOME

		COOPERATORS		NON-COOPERATORS
MEAN =	P	4,216.3	P	6,119.2
STD. DEV. =	P	3,843.9	P	4,861.0
N =		25		25
		DIFFERENCE =	P/	-1902.80
STD. ERROR OF DIFFERENCE =				1239.4
T =		-1.5352 (D.F. = 48)		
PROB. =		0.0656		

Conclusion: The NSF cooperators were significantly poorer than the non-cooperators in 1985 at 90 percent confidence level.

2. DIFFERENCE IN 1988 (REAL) INCOME a/

		COOPERATORS		NON-COOPERATORS
MEAN =	P	8,703.3	P	8,369.6
STD. DEV. =	P	6,790.3	P	4,723.4
N =		25		25
		DIFFERENCE =	P	333.7
STD. ERROR OF DIFFERENCE =				1,654.3
T =		0.2017 (D.F. = 48)		
PROB. =		0.4205		

Conclusion: On the average 1988 real incomes do not vary significantly between the NSF cooperators and non-cooperators.

Table 6 (cont'd.)

3. DIFFERENCE IN REAL INCOME CHANGE, 1985-88

		COOPERATORS		NON-COOPERATORS
MEAN =	P	4,487.0	P	2,250.5
STD. DEV. =	P	8,400.1	P	7,941.5
N =		25		25
DIFFERENCE =				2,236.5
STD. ERROR OF DIFFERENCE =				2,312.0
T =		0.9674 (D.F. = 48)		
PROB. =		0.1691		

Conclusion: The average increase in real income by P4,487 among the NSF cooperators is significantly higher than the P2,250 average increase in real income among the non-cooperators at 80 percent confidence level.

a/ Current 1988 income was deflated to 1985 terms using the national CPI. The Region VII CPI indicates lower price increases as compared to the national CPI.

Source: 1989 Household Survey, CVRP-I Benefit Monitoring Study.

Table 7
Income Tests: Social Forestry (SF) Cooperators Vs. Non-Cooperators

1. DIFFERENCE IN 1985 INCOME

		COOPERATORS		NON-COOPERATORS
MEAN =	P	4,879.0	P	3,811.2
STD. DEV. =	P	1,841.0	P	3,332.2
N =		5		7
DIFFERENCE =				1067.8
STD. ERROR OF DIFFERENCE =				1658.0
T =		0.6441 (D.F. = 10)		
PROB. =		0.2670		

Conclusion: On the average SF cooperators and non-cooperators 1985 incomes are not significantly different.

2. DIFFERENCE IN 1988 (REAL) INCOME a/

		COOPERATORS		NON-COOPERATORS
MEAN =	P	9,978.3	P	7,489.1
STD. DEV. =	P	9,624.8	P	4,357.8
N =		5		7
DIFFERENCE =				2,489.2
STD. ERROR OF DIFFERENCE =				4,075.7
T =		0.6107 (D.F. = 10)		
PROB. =		0.2775		

Conclusion: On the average SF cooperators and non-cooperators 1988 real incomes are not significantly different.

Table 7 (cont'd.)

3. DIFFERENCE IN REAL INCOME CHANGE, 1985-88

		COOPERATORS		NON-COOPERATORS
MEAN =	P	5,099.3	P	3,678.0
STD. DEV. =	P	11.186.4	P	5,640.8
N =		5		7
DIFFERENCE =				1,421.3
STD. ERROR OF DIFFERENCE =				4,869.0
T =		0.2919 (D.F. = 10)		
PROB. =		0.3882		

Conclusion: On the average SF cooperators' and non-cooperators' changes, in real incomes during 1985-88 are not significantly different.

a/ Current 1988 income was deflated to 1985 terms using the national CPI. The Region VII CPI indicates lower price increases as compared to the national CPI.

Source: 1989 Household Survey, CVRP-I Benefit Monitoring Study.

Table 8
Summary of Conclusions: Tests on Panel Respondents' Income

CVRP-I:

1. CVRP-I cooperators had significantly lower 1985 incomes than non-cooperators, at 90 percent confidence level;

2. Cooperators earned higher real incomes in 1988 compared to non-cooperators at 80 percent confidence level, because

3. the average increase in cooperators' income by P5,674 in 1985-88 is significantly higher than that of P2,613 for the non-cooperators at 90 percent level of confidence.

UPLAND AGRICULTURE (UA) PROJECT

4. Although the mean 1985 income of UA cooperators is lower than non-cooperators' average 1985 income, the difference is not statistically significant.

5. Although UA cooperators' have higher average 1988 real income than non-cooperators the difference is not statistically significant.

6. However, on the average, the increase in real income by P6,879 experienced by the UA cooperators is higher than the P2,700 increase among non-cooperators at 80 percent confidence level.

NEARSHORE FISHERIES (NSF) PROJECT

7. NSF cooperators were significantly poorer than non-cooperators in 1985 at 90 percent confidence level.

8. On the average 1988 real incomes do not vary significantly between NSF cooperators and non-cooperators.

9. This catching up is due to the average increase in real income by P4,487 among NSF cooperators which is significantly higher than the P2,250 average increase in real income among the non-cooperators at 80 percent confidence level.

SOCIAL FORESTRY (SF) PROJECT

10. On the average SF cooperators' and non-cooperators' 1985 incomes are not significantly different.

11. SF cooperators' and non-cooperators' real incomes in 1988 are also not significantly different.

12. On the average, SF cooperators' and non-cooperators' change in real incomes during 1985-88 are not significantly different.

Source: 1989 Household Survey, CVRP-I Benefit Monitoring Study.

Analysis of 1988 Income from Specific Sources: Cooperators Versus Non-Cooperators

Tests were conducted on specific income sources. The incomes of all 1989 survey respondents were compared. The results, as shown in Table 9, are consistent with the results of the tests on panel respondents. For example, in all CVRP-I sites, the non-adoptors' average income from employment is considerably higher than the adoptors' wage income (₱ 11,761 vs. ₱ 5,912). On the other hand, cooperators earn higher income from farming than non-cooperators (₱ 5,037 vs. ₱ 3,553).

Farm earnings also make a difference in upland agriculture and in nearshore fishery sites. Livestock raising is an important source of additional income for upland agriculture cooperators, while "other sources" bring good income to nearshore fishery non-cooperators (Table 9).

In the case of social forestry, income from three sources (employment, farming, and forest products) were compared. The results showed no significant differences in income between project participants and non-participants.

C. Quality of Life Before and During CVRP

Table 10 presents the values of indicators of the quality of life for CVRP adoptors and non-adoptors. In general, both groups had almost similar perceptions of the quality of their life. Their responses to various indicators showed only minor differences in percentage distribution. This indicates that although there are income disparities among them, the differences in the quality of their life have yet to be translated into variations in the other indicators, such as ownership of homelot, house, and building materials. It is unlikely that, only three years into the project, such changes can be felt immediately.

IV. SUMMARY AND CONCLUSIONS

The effects of CVRP-I are most noteworthy in the practice of resource conservation activities. There are already significant spread effects to non-formal participants in the project sites. On the average, cooperators implement resource conservation more often than non-cooperators.

On income changes, notable differences are seen in nearshore fishery sites, where the adoptors, a poorer group at the start of the project, caught up with the non-adoptors by 1988. This is borne by both the panel analysis and the 1988 survey results. For upland agriculture sites, improvements in the gross income of cooperators are noticeable, but these are not statistically significant as far as the panel respondents' data are concerned. However, in terms of income from farming, differences in the 1988 earnings of cooperators and non-cooperators are statistically significant. In social forestry, there are no significant income effects from CVRP.

It is too early to use the other indicators to test the differences in the quality of life between cooperators and non-cooperators. Changes in the quality of life would probably need longer time to take effect.

Table 9
Income from Specific Sources, Cooperators Versus Non-Cooperators
1988

Project Area & Income Source			Cooperators		Non-Cooperators	t-value	two-tailed test	
1.	All CVRP sites	P/	10,030	P/	8,057	1.0387	0.1507	***
	employment		5,912		11,761	-2.22	0.0350	*
	farming		5,037		3,553	2.95	0.0040	*
2.	Upland Agriculture		11,268		7,784	0.786	0.2182	
	employment		5,703		11,221	-1.37	0.2130	
	farming		5,559		3,998	2.08	0.0390	*
	livestock raising		2,075		1,042	3.23	0.0020	*
3.	Nearshore Fishery		8,703		8,370	0.20	0.4205	
	employment		11,115		11,998	-0.23	0.8220	
	farming		4,006		2,850	1.73	0.0870	**
	fishing		9,496		9,219	0.09	0.9290	
	other sources		2,950		10,235	-2.25	0.0350	*
4.	Social Forestry		9,978		7,489	0.61	0.2780	
	employment		3,279		2,528	0.50	0.6210	
	farming		5,298		4,812	0.48	0.6290	
	forest products		1,467		1,165	0.31	0.7690	

* Significant at 95% confidence level.
** Significant at 90% confidence level.
***Significant at 80% confidence level.

Source: Estimates made from 1989 Survey Data. All values in 1985 pesos.

Table 10
Values of Social Indicators: Cooperators Versus Non-cooperators, 1989

	SOCIAL INDICATOR	COOPERATORS		NON-COOPERATORS	
1.	Perception of Present Economic Status				
	Poor	214	61%	204	61%
	Moderate	135	39%	126	38%
	Above #2 choice	1	0%	3	1%
		350	100%	333	100%
2.	Perception of Present Economic Status (Compared to One Year Ago)				
	Better off	111	31%	90	27%
	Worse off	50	14%	47	14%
	The same	193	55%	195	59%
		354	100%	332	100%
3.	Perception of Present Economic Status (Compared to Five Years Ago)				
	Better off	148	42%	118	36%
	Worse off	42	12%	35	11%
	The same	163	46%	177	54%
		353	100%	330	100%
4.	SOURCE OF DRINKING WATER				
	UA-BOHOL				
	1 Spring	9	25%	5	13%
	2 Open/deep well	25	69%	28	74%
	3 Artesian well	1	3%	1	3%
	4 Rain water			2	5%
	5 Piped water	1	3%		
	6 River				
	7 Others			2	5%
		36	100%	38	100%

Table 10 (cont'd)

	COOPERATORS		NON-COOPERATORS	
UA-CEBU				
1 Spring	8	22%	15	45%
2 Open/deep well	1	3%	1	3%
3 Artesian well	6	17%	1	3%
4 Rain water	2	6%	1	3%
5 Piped water	19	53%	14	42%
6 River			1	3%
7 Others				
	36	100%	33	100%
UA-NEGROS				
1 Spring	21	60%	11	39%
2 Open/deep well	11	31%	13	46%
3 Artesian well	1	3%	1	4%
4 Rain water	1	3%		
5 Piped water	1	3%	2	7%
6 River			1	4%
	35	100%	28	100%
UA-SIQUIJOR				
1 Spring	9	26%	12	32%
2 Open/deep well	2	6%	1	3%
3 Artesian well	7	20%	8	21%
4 Rain water				
5 Piped water	16	46%	17	45%
6 River				
7 Others	1	3%		
	35	100%	38	100%
NSF-BOHOL				
1 Spring				
2 Open/deep well	27	77%	22	59%
3 Artesian well	7	20%	10	27%
4 Rain water	1	3%	2	5%
5 Piped water			2	5%
6 River				
7 Others			1	3%
	35	100%	37	100%

Table 10 (cont'd)

	COOPERATORS		NON-COOPERATORS	
NSF-BOHOL				
1 Spring	1	3%	2	5%
2 Open/deep well	1	3%		
3 Artesian well	1	3%	5	13%
4 Rain water			4	11%
5 Piped water	26	70%	19	50%
6 River	1	3%	1	3%
7 Others	7	19%	7	18%
	37	100%	38	100%
NSF-NEGROS				
1 Spring	1	3%	6	17%
2 Open/deep well	1	3%	1	3%
3 Artesian well	8	22%	7	20%
4 Rain water				
5 Piped water	26	72%	21	60%
6 River				
7 Others				
	36	100%	35	100%
NSF-SIQUIJOR				
1 Spring	1	3%		
2 Open/deep well	1	3%	3	8%
3 Artesian well	8	22%	10	28%
4 Rain water				
5 Piped water	26	72%	23	64%
6 River				
7 Others				
	36	100%	36	100%
SF-AYUNGON				
Spring	16	25%	26	49%
Open/deep well	48	75%	26	49%
Artesian well				
Rain water				
Piped water			1	2%
River				
Others				
	64	100%	53	100%

Table 10 (cont'd)

5. WHETHER ANY HH MEMBERS GOT SICK PAST YEAR

	Total		COOPERATORS		NON-COOPERATORS	
Yes	373	57%	181	53%	192	60%
No	285	43%	158	47%	127	40%

6. OWNERSHIP OF HOMELOT

	Cooperators Yes		No		Total	Non-cooperators Yes		No		Total
UA-BOHOL	25	66%	13	34%	38	23	61%	15	39%	38
UA-CEBU	21	57%	16	43%	37	17	52%	16	48%	33
UA-NEGROS	22	63%	13	37%	35	14	50%	14	50%	28
UA-SIQUIJOR	22	63%	13	37%	35	23	61%	15	40%	38
NSF-BOHOL	27	77%	8	23%	35	19	51%	18	49%	37
NSF-CEBU	14	38%	23	62%	37	22	58%	16	42%	38
NSF-NEGROS	13	36%	23	64%	36	16	46%	19	54%	35
NSF-SIQUIJOR	30	79%	8	21%	38	22	63%	13	37%	35
SF-AYUNGON	43	67%	21	33%	64	35	66%	18	34%	53

7. OWNERSHIP OF HOUSE

	Cooperators Yes		No		Total	Non-cooperators Yes		No		Total
UA-BOHOL	34	92%	3	8%	37	35	92%	3	8%	38
UA-CEBU	36	97%	1	3%	37	26	81%	6	19%	32
UA-NEGROS	33	94%	2	6%	35	21	75%	7	25%	28
UA-SIQUIJOR	31	89%	4	11%	35	32	84%	6	16%	38
NSF-BOHOL	33	94%	2	6%	35	36	97%	1	3%	37
NSF-CEBU	34	92%	3	8%	37	32	84%	6	16%	38
NSF-NEGROS	32	89%	4	11%	36	33	94%	2	6%	35
NSF-SIQUIJOR	36	95%	2	5%	38	31	86%	5	14%	36
SF-AYUNGON	63	98%	1	2%	64	49	92%	4	8%	53

8. HOUSING MATERIALS

	COOPERATORS		NON-COOPERATORS	
UA-BOHOL				
Light	26	70%	31	82%
Strong	5	14%	5	13%
Mixed	6	16%	2	5%

Table 10 (cont'd),

	COOPERATORS		NON-COOPERATORS	
UA-CEBU				
Light	23	62%	29	88%
Strong	3	8%	1	3%
Mixed	11	30%	3	9%
	37	100%	33	100%
UA-NEGROS				
Light	24	69%	20	71%
Strong	2	6%	1	4%
Mixed	9	26%	7	25%
	35	100%	28	100%
UA-SIQUIJOR				
Light	15	43%	20	53%
Strong			4	11%
Mixed	20	57%	14	37%
	35	100%	38	100%
NSF-BOHOL				
Light	21	60%	23	62%
Strong			4	11%
Mixed	14	40%	10	27%
	35	100%	37	100%

Table 10 (cont'd)

	COOPERATORS		NON-COOPERATORS	
NSF-CEBU				
Light	23	62%	22	58%
Strong	5	14%	6	16%
Mixed	9	24%	10	26%
	37	100%	38	100%
NSF-NEGROS				
Light	30	86%	24	69%
Strong	1	3%		
Mixed	4	11%	11	31%
	35	100%	35	100%
NSF-SIQUIJOR				
Light	15	39%	12	34%
Strong	4	11%	6	17%
Mixed	19	50%	17	49%
	38	100%	35	100%
SF-AYUNGON				
Light	63	98%	50	98%
Strong	1	2%		
Mixed			1	2%
	64	100%	51	100%

9. OWNERSHIP OF LOT OTHER THAN HOMELOT

	Cooperators					Non-cooperators				
	Yes		No		Total	Yes		No		Total
UA-BOHOL	29	83%	6	17%	35	26	68%	12	32%	38
CEBU	30	91%	3	9%	33	23	72%	9	28%	32
NEGROS	19	56%	15	44%	34	25	56%	12	44%	27
SIQUIJOR	28	80%	7	20%	35	31	86%	4	11%	35
NSF-BOHOL	21	62%	13	38%	34	21	57%	16	44%	37
CEBU	13	36%	23	64%	36	13	37%	22	63%	35
NEGROS	4	12%	29	88%	33	8	25%	24	75%	32
SIQUIJOR	23	62%	14	38%	33	19	59%	13	41%	32
SF-AYUNGON	53	83%	11	17%	64	40	77%	12	23%	52

In brief, we may conclude that the conduct of CVRP has made a significant impact on the project sites. Resource conservation activities are implemented by both project cooperators and non-cooperators, with higher rates of practice among cooperators. This has resulted in larger real income increases for project adoptors compared to real income increments for non-adoptors during the period 1985-1988.

Measurement of the positive effects of natural resource enhancement, management and rehabilitation efforts however are best monitored during a longer timespan due to the gestation periods involved in certain outputs. The benefit monitoring study does not, as yet, capture the potential tree products from either upland or mangrove trees nor the effects of coral reef regeneration. The benefits thus so far measured in this report pertain mostly to short-run impacts. Subsequent effort hence need to be exerted in measuring the longer term outputs of the various components of CVRP-I.

Annex Table A
CVRP-I Panel Survey Data, 1985 & 1988*

	record #	compnt	adoptor	degree	prov	y85	y88	RY88	rychange
1	134	1	1	1	4	770	4919	4325	3555
2	466	1	1	4	4	1200	1400	1231	31
3	78	1	1	1	3	14977	8721	7669	-7308
4	459	1	1	4	3	1802	9020	7931	6129
5	684	1	1	4	3	8110	4545	3996	-4114
6	77	1	1	2	3	1982	10720	9426	7444
7	293	1	1	1	2	2520	7014	6167	3647
8	266	1	1	1	2	4065	1598	1405	-2660
9	267	1	1	1	2	2600	2877	2529	-71
10	490	1	1	3	4	2153	2415	2124	-29
11	653	1	1	4	4	8890	6738	5925	-2965
12	665	1	1	4	4	2380	6935	6098	3718
13	499	1	1	3	4	1415	60510	53206	51791
14	176	1	1	1	1	10660	16400	14421	3761
15	94	1	1	2	1	5624	11100	9760	4136
16	485	1	1	3	4	4800	14300	12574	7774
17	530	1	1	4	1	7000	29000	25500	18500
18	193	1	1	1	1	2740	10250	9013	6273
19	27	1	1	2	2	3830	7692	6764	2934
20	190	1	1	1	1	1120	2348	2065	945
21	194	1	1	1	1	8753	8284	7284	-1468
22	172	1	1	1	1	7832	65207	57337	49505
23	204	1	1	1	1	3090	6436	5659	2569
24	533	1	1	4	1	4488	8860	7791	3303
25	171	1	1	2	1	3060	22300	19608	16548
26	174	1	1	2	1	2380	11200	9848	7468
27	544	1	1	4	2	250	5202	4574	4324
28	497	1	2	3	4	2700	2124	1868	-832
29	169	1	2	1	1	3050	11650	10244	7194
30	455	1	2	4	3	1450	2141	1883	433
31	133	1	2	2	4	870	8538	7508	6638
32	28	1	2	1	2	5400	1648	1449	-3951
33	135	1	2	1	4	670	57577	50627	49957
34	659	1	2	4	4	5600	9729	8554	2954
35	554	1	2	4	2	6216	1725	1517	-4699
36	15	1	2	1	1	3315	3800	3341	26
37	177	1	2	1	1	8010	1030	906	-7104
38	654	1	2	4	4	23406	5848	5142	-18264
39	657	1	2	1	4	1920	1898	1669	-251
40	20	1	2	1	1	1675	8124	7143	5468
41	681	1	2	4	3	6580	8100	7122	542

*Legend at end of table.

Annex A (cont'd)

	record #	compnt	adoptor	degree	prov	y85	y88	RY88	rychange
42	369	2	1	3	2	724	5088	4474	3750
43	514	2	1	3	4	3944	11568	10172	6228
44	503	2	1	4	4	3870	15838	13926	10056
45	504	2	1	4	4	11430	3872	3405	-8025
46	211	2	1	2	3	3100	2592	2279	-821
47	346	2	1	2	2	5455	12030	10578	5123
48	265	2	1	3	3	5238	5400	4748	-489
49	625	2	1	4	1	15175	4988	4386	-10789
50	238	2	1	2	3	13500	4500	3957	-9543
51	60	2	1	2	2	1065	2005	1763	698
52	621	2	1	4	1	830	7730	6797	5967
53	508	2	1	4	4	6690	16819	14789	8099
54	168	2	1	1	2	3981	3600	3165	-816
55	347	2	1	1	2	310	16800	14772	14462
56	264	2	1	1	3	1590	12000	10552	8962
57	219	2	1	1	3	3969	9100	8002	4033
58	611	2	1	3	1	2340	4916	4323	1983
59	409	2	1	4	4	1710	21600	18993	17283
60	614	2	1	3	1	2500	3260	2867	367
61	117	2	1	1	1	880	2565	2255	1375
62	426	2	1	3	4	3361	20617	18129	14768
63	214	2	1	2	3	3750	25550	22466	18716
64	136	2	1	4	1	4770	2000	1759	-3011
65	263	2	1	2	3	2727	27132	23857	21130
66	167	2	1	1	2	2500	5880	5170	2670
67	604	2	2	4	1	12050	6780	5962	-6088
68	399	2	2	3	4	8600	10706	9414	814
69	410	2	2	4	4	2316	16360	14385	12070
70	396	2	2	4	4	7230	11964	10520	3290
71	412	2	2	3	4	21110	2211	1944	19166
72	344	2	2	2	2	7288	3750	3297	-3991
73	64	2	2	1	4	9190	18170	15977	6787
74	610	2	2	3	1	1550	10800	9496	7946
75	626	2	2	4	1	4650	12920	11361	6711
76	138	2	2	1	1	3990	2753	2421	-1569
77	511	2	2	4	4	6300	4680	4115	-2185
78	240	2	2	1	3	7850	600	528	-7322
79	23	2	2	2	3	1665	8568	7534	5869
80	618	2	2	3	1	9100	7160	6296	-2804
81	630	2	2	4	1	200	12760	11220	11020
82	602	2	2	4	1	750	11552	10158	9408
83	342	2	2	2	2	5775	16005	14073	8298
84	624	2	2	4	1	460	12120	10657	10197
85	395	2	2	3	4	7250	5702	5014	-2236
86	249	2	2	1	3	6290	5450	4792	-1498
87	374	2	2	4	2	2400	3305	2906	506
88	66	2	2	1	4	1750	22230	19547	17797

Annex A (cont'd)

	record #	compnt	adoptor	degree	prov	y85	y88	RY88	rychange
89	65	2	2	2	4	9900	10796	9493	-407
90	601	2	2	4	1	13400	9036	7945	-5455
91	627	2	2	4	1	1915	11585	10187	8272
92	52	3	1	1	3	1850	29000	25500	23650
93	591	3	1	3	3	4500	3225	2836	-1664
94	329	3	1	2	3	5595	13150	11563	5968
95	333	3	1	2	3	6450	1545	1359	-5091
96	312	3	1	1	3	6000	9820	8635	2635
97	594	3	2	4	3	2143	6620	5821	3678
98	304	3	2	1	3	792	2710	2383	1591
99	316	3	2	1	3	3475	4010	3526	51
100	674	3	2	4	3	466	17670	15537	15071
101	314	3	2	2	3	10232	8550	7518	-2714
102	595	3	2	4	3	4400	10860	9549	5149
103	311	3	2	2	3	5170	9200	8090	2920

Legend:

record # = record number
compnt = CVRP component (1 = Upland Agriculture; 2 = Nearshore Fisheries; 3 = Social Forestry)
adoptor = formal participation of CVRP (1 = yes; 2 = no)
degree = extent of practice of resource conservation practices (1 = active practice by adoptors; 2 = non-active adoptor; 3 = non-active non-adoptors; 4 = active practice by non-adoptors, or indirect beneficiary)
prov = location of activity (1 = Cebu; 2 = Bohol; 3 = Negros Oriental; 4 = Siquijor Island)
y85 = income in 1985, in current pesos
y88 = income in 1988, in current pesos
RY88 = 1988 income expressed in 1985 pesos; also termed real income
rychange = RY 88 minus y85; change in real income during 1985-88

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